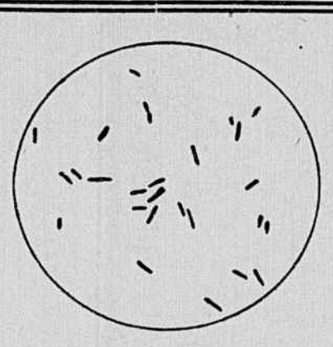
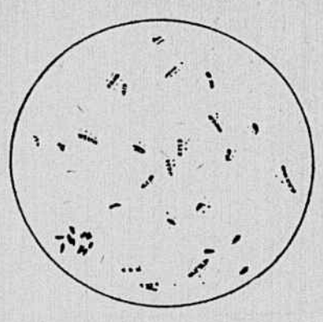
# Discoveries by French Scientists That Promise to Wipe Out Typhoid

## The Latest and Most Successful Treatment by Professor Vincent, the Military Doctor, Consists in Injecting 2,000,000,000 Dead Microbes Killed by Ether Without Heating or Antiseptics.



The Microbes of Typhoid Fever in Their Live and Virulent Condition.



The Microbes When Killed for Use in the Anti-Typhoid Vaccine.


Diagram Recording the Successful Application of Professor Chantemesse's Vaccine to a Patient Actually Suffering from Typhoid.

Professor Vincent, the Military Physician, Administrating His Vaccine Which Is Made from Many Races of Microbes Killed by Ether Without Heating.

FRENCH medical publications announce that French scientists have at last perfected a vaccine which is a certain preventive of typhoid fever when inoculated in advance. Experiments with vaccines for this purpose have been going on in many countries but the French claim that they were pioneers in the work and have now brought the vaccine to a higher degree of perfection than other scientists.

The use of the vaccine has become general in the French army. At present it is only a certain remedy when inoculated in advance, but it has some value when administered during an attack of the disease. Experiments are now being conducted to make it an effective cure.

Typhoid, it should be remembered, stands fifth among the causes of death in the United States and is increasing in severity. In France it kills 5,000 a year out of a population of less than 40,000,000.

The first experiments with antityphoid vaccine upon animals began in France about twenty years ago. Conservative scientists did not dare to experiment on man at that time, because human typhoid fever differs considerably from that of animals, and they could not draw a reliable conclusion from the immunity conferred on the latter. Distinguished biologists advised it would not be wise to try the remedy on man until they had succeeded in giving true typhoid fever to the chimpanzee, that animal being practically the same as man from the physical point of view. Experiments, therefore, went on slowly, achieving progress little by little, but not attracting the attention of the general public.

There are now two kinds of anti-typhoid vaccine in France. One is the "civil" vaccine of Prof. Chantemesse, who is a physician at the Hotel Dieu Hospital, and the other the "military" vaccine of Prof. Vincent, who is a professor in the great Military Hospital of Val-de-Grace, in Paris. Each of these two scientists recognizes the efficacy of his rival's vaccine while maintaining that his own is superior. The experiments of Prof. Chantemesse were first made public, but it seems probable that the Vincent preparation will be found superior for general purposes.

The general principle of all vaccines is to introduce into the healthy body the agent of a disease under such conditions as to bring on a defensive reaction, which prevents the disease from developing and thereafter confers on the subject an immunity lasting for a varying period against the disease.

To realize this double condition the scientists find themselves confronted with two contradictory requirements. In order to obtain the greatest immunity it seems desirable to inoculate a virus as little weakened as possible; on the other hand the doctor must take care that the inoculation does not kill the patient or give the body too violent a shock.

In some cases scientists follow the method of preparing vaccines by heating perfected by Pasteur and his assistant, Roux. By this method they heat the disease microbe to a temperature which allows it to live but diminishes its activity. In making anti-typhoid vaccine they employ sterilized cultures, that is to say, dead microbes. By this method they introduce into the body the peculiar substances, principally toxins, which are contained in the body of the microbe.

The use of sterilized cultures is much safer to the patient, for if a vaccine contains living microbes they may multiply in the body and eventually increase the injurious action of the bacilli already there. This is apt to happen where a patient inoculated is in the incubation stage of the disease, a fact which the doctor cannot generally diagnose.

Now the microbes may be killed by heat or by the use of a chemical agent. It is principally in the choice of this agent that the Chantemesse vaccine and the Vincent vaccine differ.

The first tests of anti-typhoid vaccination on animals were made at the same time in France and in Germany in 1887. Prof. Frenkel, of Berlin, injected small quantities of living microbes not attenuated into his subjects, while Drs. Chantemesse and Widal, of Paris, sterilized a culture bouillon of the microbes to a temperature of 248 deg. F. which killed the germs and left the toxins more or less intact.

The German method at this stage was not applicable to man, since it would have meant nearly an even chance of killing him. The French method was capable of becoming useful to man, since the heated toxins would never be likely to kill him, although in some forms they might make him seriously ill. The experiments in France soon proved that vaccination with microbes sterilized by heat would give immunity against a dose of typhoid microbes that would kill unvaccinated animals.

These experiments were made on guinea pigs, rabbits and horses. Although the organization of these animals differs from that of man in many respects experience has shown that a vaccine which takes effect upon them usually acts in the same manner in man. At this stage, however, many doctors insisted that it would not be safe to try the Chantemesse vaccine on man. They pointed out that the injuries or lesions produced by typhoid in man and animal were very different. Dr. Chantemesse replied that the dissimilarity of the injuries was of little importance, because typhoid was essentially a poisoning of the blood, which showed itself in the same form in man and animal. Nevertheless in face of the lively opposition shown against him the Professor refrained for a long time from experimenting upon man.

Two German doctors, Pfeiffer and Kolle, adopted the French method and boldly took the initiative in trying it on a human subject. In 1896 they injected the vaccine sterilized by heating into a young laboratory attendant. He did not suffer any sickness, which was an important point proved, but on the other hand no test was made to decide if he had been immunized against typhoid.

In the same year Prof. Almroth Wright, of England, prepared a vaccine with a lower sterilization temperature. Soon after this the Boer war broke out and he had a splendid opportunity to try the vaccine in the English army. The results were quite satisfactory. Out of 1,000 unvaccinated men there were 141 cases of typhoid and 31 deaths, while out of the same number of vaccinated soldiers there were 20 cases and 4 deaths. At Bloemfontein nearly 100,000 British soldiers were prostrated with typhoid, almost crippling the army. After this the use of the vaccine became universal among the soldiers. The preparation at this time was not suitable for use in civil life. It produced more or less serious attack of illness. While young and vigorous men like soldiers were able to recover from this in a short time, it would not have been wise to use the preparation indiscriminately on the civil population. The illness was probably explained by the low temperature at which the microbes were killed.

Prof. Wright at first killed his microbes at a temperature of 167 Fahr., and then reduced it to 140 degrees. Prof. Chantemesse having started by sterilizing his microbes at 248 deg. Fahr. for ten minutes, reduced this to 212 degrees by 1892. To-day he heats them for one hour at 132 deg. Fahr. That he has found to be the minimum temperature which is certain to kill the microbes.

He then adds to the preparation a light dose of some antiseptic such as lysol or cresol. This prevents the development in the vaccine of any germ which may have slipped in during the elaborate manipulation. Some germs resist a temperature of 132 degrees while others might find their way in after the sterilization.

The vaccine of Dr. Chantemesse contains 120,000,000 dead microbes in a cubic centimetre of water, that is about a teaspoonful of water. It is prepared in the form of a slightly opalescent liquid. Vaccination is performed on the upper part of the arm by means of an old fashioned hypodermic syringe. The doctor washes the place to be punctured with a little tincture of iodine. No pain is felt either during or after the operation. There is neither itching nor outbreak of pustules such as commonly occurs after vaccination for small pox. Sometimes there is a slight fever which is remedied by taking an antipyrine tablet.

Each patient receives under the Chantemesse treatment 3,000,000,000 sterilized microbes divided up into four injections seven days apart. The strength of the injections is graded as follows:

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|---|---|
| 1st injection, | 300,000,000 microbes. |
| 2nd injection, | 600,000,000 microbes. |
| 3rd injection, | 900,000,000 microbes. |
| 4th injection, | 1,200,000,000 microbes. |
| Total ..... | 3,000,000,000 microbes. |

Every Friday at 11 o'clock Prof. Chantemesse and his assistant, Prof. Rodriquez, receive patients who desire to be vaccinated at their laboratory in the Hotel Dieu Hospital in Paris. The number of persons who go for treatment knowing that it will cause them no illness and protect them for a long time against the grave danger of typhoid is constantly increasing.

Dr. Vincent, the other French scientist working on this problem, only began his studies in typhoid vaccination in 1908. He recognized the efficacy of vaccine sterilized by heating as already prepared, but he found that it suffered from two defects: 1. The heat attenuates somewhat the properties of the microbe. 2. A further attenuation is produced by the introduction of an antiseptic.

Dr. Vincent argued that these attenuations produced a modification of the quality of the microbes which could not be compensated by increasing the quantity. He pointed out also that smallpox vaccine and other vaccines were not treated with antiseptics. He believed that if the preparation was properly done it would be unnecessary to introduce any antiseptics. Dr. Vincent then introduced an ingenious improvement into his vaccine. Typhoid fever, like other germ diseases, has many different races of microbes. The races vary according to the country, the intensity of the epidemic which is prevailing and other conditions. Dr. Vincent discovered that anti-typhoid vaccine is most effective if it is what he calls "polyvalent," that is to say, having the strength of many races. He therefore makes a preparation from twelve or more families of microbes.

He prepares a culture of these different microbes in eighteen hours. This is what scientists call a "young" culture. In this short space of time the secretions of the microbe have not been very abundant, and therefore the culture has only a feeble virulence. Instead of killing them with heat, Dr. Vincent then adds ether. At the end of four hours the microbes are dead. They are separated from the ether by simple evaporation.

In early experiments made by Dr. Vincent he found that guinea pigs injected with this vaccine resisted inoculations of living microbes strong enough to kill guinea pigs which had only been protected with vaccine sterilized by heating.

The vaccine prepared by Dr. Vincent contains 400,000,000 microbes to a cubic centimetre. As the microbes are less attenuated than in the heated vaccine, a smaller number must be injected. Dr. Vincent injects 2,000,000,000 only, divided into four injections at intervals of seven days and graded as follows:

| | |
|---|---|
| 1st injection, | 200,000,000 microbes. |
| 2nd injection | 400,000,000 microbes. |
| 3rd injection, | 600,000,000 microbes. |
| 4th injection, | 800,000,000 microbes. |
| Total .... | 2,000,000,000 microbes. |

Although this vaccine was designed primarily for the French army its use is not restricted to the soldiers. Every Monday morning at 11 o'clock Dr. Vincent receives at Val-de-Grace Hospital all civilians who wish to be vaccinated. An increasing number of them are going there for treatment.

Professor Chantemesse Administering His Anti-Typhoid Vaccine to Civilians. It Is Made from Dead Microbes Killed by Heating.

Other vaccines prepared without heating had caused considerable sickness, but Dr. Vincent reports that this feature is entirely absent from his treatment. He attributes this principally to the relatively small number of microbes injected and the absence of the antiseptics. The pain which followed the use of heated vaccine in the Japanese army led to its abandonment for a time.

The two vaccines have already given most valuable results to the French army and nation and under various conditions.

In 1911 the Minister of War instructed a scientific delegation to practice the anti-typhoid vaccine on the troops operating on the frontier of Algeria and Morocco. Among the unvaccinated men there were 115 cases and 8 deaths among a thousand men. No case occurred among the men inoculated with the Vincent vaccine. The Chantemesse vaccine inoculated in 44 soldiers gave very satisfactory results.

After this preliminary test the Vincent vaccine was used on a much larger scale. At the end of 1912 the number of vaccinated soldiers reached 10,000 in the French-African colonies and 37,000 in France. Among these 47,000 men not a single death has occurred. The only mishap noted was one case of sickness in Algeria which was attributed to the use of vaccine that was too old. Before this there had been on the average 11.23 cases among 1,000 men, with 1.59 deaths in Africa, 3.67 cases with 0.47 deaths in France per thousand soldiers in each year. In September, 1912, a very violent epidemic broke out in the garrison of Avignon numbering 2,053 men. Among 1,366 inoculated men, 8.41 of whom underwent inoculation during the epidemic, there was not a single case of typhoid. Among the 687 uninoculated men there were 155 cases and 21 deaths.

During a typhoid epidemic at Paimpol in Brittany, 400 inoculated civilians escaped while the rest of the population showed 150 cases and 11 deaths. In 1912 the minister of marine authorized optional typhoid vaccination among the crews of the navy and the government workmen in the naval ports. Among a total of 67,000 uninoculated men there were 542 cases from April to the end of December, 1912. 3,107 inoculated men escaped completely.

So far the anti-typhoid vaccine has been regarded primarily as a preventive remedy. In the case of soldiers and men who are likely to run grave danger from a typhoid infection it is well worth while for them to be protected by inoculation in advance, especially when the treatment causes no sickness. Whether the average civilian will wish to protect himself in this way against a problematic danger is of course doubtful. There is, however, strong reason to believe that the vaccine has a curative value when administered during the disease, but it has not yet been prepared in the right form for this purpose. It has been tested several times during the progress of the disease. Sometimes it produces a remarkably sudden cure, at other times it appears to cause only a slight improvement, while in other cases the result is absolutely nil.

It has not yet been determined for what period the vaccine gives immunity against typhoid.

# THE WOMAN'S PART - - - By A. Wright Fox

HELMSFORD shook his head.

"Man was not made to live alone," he quoted sapiently. "And in a hole like this, female companionship of some sort is necessary." He paused, knocked the ashes from his pipe, and stared reflectively into the tropic night.

Myriads of stars spangled the sky, turning it into a web of jewels, and beyond the curving belt of palms, tumbled the moonlit, everchanging sea, dotted here and there with ruddy points of light. The air had a taint strangely reminiscent of marigolds. Now and again came the whine of some prowling pariar dog, or a faint, hoarse mutter from the coolie lines; otherwise the night was possessed of a silence as of the grave.

A flying night-beetle whirred suddenly by, and, roused from abstraction, Helmsford leaned forward and filled up his glass with soda. He drank, then got on his feet, and, leaning against the veranda rail, looked down at Digby's haggard face with some impatience.

"I mean it, old man," he said. "This solitary business is playing the deuce with you. Confound it all, you look like a corpse!"

Jim Digby smiled wearily.

"I'm all right," he said. "In this fever-stricken hole, what can you expect? Your own personal beauty's nothing to write home about, if it comes to that. And—forgive me if I tread on your corns, old chap—I'm afraid I don't altogether cotton on to the idea of a native housekeeper. Dont' think I'm setting up for the stained-glass article, call me a fool if you like, but—well, there's a girl waiting for me at home, and I"——

"You're worse than a fool," broke in Helmsford, crossly. "The next touch of fever you get will put you out like a snuffed candle. That's why I say you want someone to look after you. There are lots of little things a fellow doesn't trouble to do for himself."

"We won't talk about it, if you please, old chap," interposed Digby quietly.

Helmsford shrugged.

"As you like,' he said, 'but I stick to what I say. Good Lord! you wouldn't be the first man who'd done it, and then gone home, got married, and lived to grow side-whiskers and take the plate round on Sundays. Ideas like yours belong to suburbia. I had 'em when I first came out—kept 'em unspotted for over a year, too. Then I caved in." He laughed shortly. "But you're such a rum sort. How long have you been out here?"

"Nearly six years,' Digby answered. 'Thank God I've only three months more, and then it's home"—

"And the girl," sneered Helmsford. He laughed again, unpleasantly, but with a certain wistfulness, as Digby nodded. "You're lucky," he said curtly. "The girl I left behind me got married a year after I cleared out."

He sucked moodily at his pipe resentful of Digby's unspoken sympathy.

"White and black women are all the same," he declared. "A treacherous lot, all of 'em; they'll kiss you one minute, stab you in the back the next.'

"Not all,' contradicted Digby quietly, resting his arms on the verandah rail watching the waves churning into a froth of foam on the moonlit beach. "Because one woman lies you can't tar and feather the whole sex like that. My girl's stuck to me for six years, and kept faith with me all the time—never missed a mail since I came out. You know, it's damned hard on a pretty girl, Helmsford, to have to wait, seeing the best years of her life go by, and very likely with a crowd of eligible fellows buzzing round her everywhere she goes. It's different for the man. After all, we have the fight for it; we're doing something all the time. The girl can only wait. That's the woman's part, and it's a damned hard one; and that's why I feel a man ought to play the game."

Helmsford only grunted.

After a constrained silence Digby fumbled in his breast pocket, and, taking out a flat leather case, passed it over. It opened with a spring, and Helmsford found himself looking into a fresh, piquant little face that smiled up at him with provoking friendliness.

An envious sigh escaped him as he handed it back again.

"Very pretty," he said.

"The prettiest girl in the world," declared Digby stoutly, replacing the portrait with anxious care. "She's a parson's daughter in Devonshire, a cream and roses girl, and with the honestest blue eyes that ever looked into a man's soul. If it hadn't been for her I should never have stuck this hell five minutes; only the thought of getting her some day has made it possible—that, and sheer hard work."

There was a footstep on the path below, and Digby swung round sharply.

"That you, Lake?" he called.

Lake, his assistant, mounted the steps, nodded curtly to Helmsford, and for reply tossed a letter over the table to Digby. A tall, melancholy individual, he mixed himself a drink and winked mournfully at Helmsford as Digby, without a word, turned off into the bungalow.

"Gone for the night," Lake commented. "I've got a letter for Cameron, too, and some gramophone records. Will you come?"

They went off together.

In the bungalow behind them, trembling with eagerness, Digby opened the letter. And this is what he read:

"My Dear Jim—I have just got your letter to say you will be home by November, and it has frightened me terribly. How can I tell you? Please don't be angry with me, but, my poor old boy, I've met someone I like better, and by the time you read this I shall be married. It looks horribly brutal in writing, but I do hope you will understand—and forgive me. Honestly, I have tried to keep faith, Jim, and it was not until I got your letter to say that you were coming home so soon that I really knew my own mind, and that I cared for the man I am marrying more than any man in the world. Please do write and tell me you forgive me, and let us still be friends. "ETHEL."

He read it through to the end, then pushed it from him and cracked into a hoarse laugh.

His face was livid.

"The woman's part—to wait," he said. "My God!"

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When they found him an hour later Jim Digby had shot himself very neatly through the heart, and before him on the table, where he had piled them for cremation, lay the charred remains of a letter and a potograph—a little heap of crumbled, gray ashes.